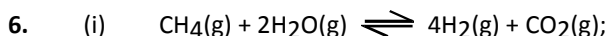


## T07D02 – 7.2a IB Practice MS

1. D
2. B
3. D
4. D
5. A



*States not required. Award [1] for balanced equation and [1] for equilibrium sign.*

$$K_c = \frac{[\text{H}_2]^4 [\text{CO}_2]}{[\text{CH}_4] [\text{H}_2\text{O}]^2};$$

ECF

units:  $\text{mol}^2 \text{ dm}^{-6} / \text{mol}^2 \text{ L}^{-2} / \text{mol}^2 \text{ l}^{-2}$ ; do not accept:  $M^2$

4

ECF

- (ii) (endothermic reaction) increase in temperature (favours the forward reaction);

absorbs (some of) the heat supplied/OWTTE;

*Award no marks for saying: "because of Le Chatelier's principle".*

low pressure (will allow system to occupy more volume);

$V_{\text{product}} > V_{\text{reactant}}$ /reaction proceeds to greater number of gaseous moles /molecules/more moles of gases on right/OWTTE;

ECF from (i)

4

- (iii) at high pressure concentration increases/reaction rate faster;  
more frequent collisions;

2

[10]

7. (i)  $(K_c =) \frac{[\text{NO}_2]^2}{[\text{N}_2\text{O}_4]}$ ;

(horizontal line) concentration of reactant and product remains constant/equilibrium reached;  
(magnitude of)  $K_c$  greater than 1;

*Accept 1.6.*

product concentration greater than reactant concentration;

4

- (ii) increased temperature shifts equilibrium position to right;  
(forward) reaction is endothermic/absorbs heat;

2

- (iii) increased pressure shifts equilibrium to left;  
fewer (gas) moles/molecules on left;

2

- (iv) both/forward and reverse rates increased/increase in forward reverse rates are equal;

activation energy reduced;

position of equilibrium unchanged;

concentration/amount of reactants and products remain constant;

value of  $K_c$  unchanged;

$K_c$  only affected by changes in temperature;

6

[14]

8. less product is present at higher temperatures;  
Therefore the forward reaction is exothermic;

2

[2]